

EX PARTE OR LATE FILED



**CTIA**

*Building The Wireless Future.*  
Cellular Telecommunications Industry Association

**Andrea D. Williams**

Assistant General Counsel

November 9, 1998

RECEIVED

NOV - 9 1998

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

Ms. Magalie Salas  
Secretary  
Federal Communications Commission  
1919 M Street, N.W., 2nd Floor  
Washington, DC 20554

**Re: CC Docket No. 94-102/  
E9-1-1/TTY Compatibility Requirements**

Dear Ms. Salas:

On November 9, 1998, the Cellular Telecommunications Industry Association ("CTIA") on behalf of the Wireless TTY Forum hand-delivered the attached letter and documents to the following:

The Honorable William E. Kennard, Chairman  
The Honorable Susan Ness, Commissioner  
The Honorable Harold Furchtgott-Roth, Commissioner  
The Honorable Michael K. Powell, Commissioner  
The Honorable Gloria Tristani, Commissioner

Mr. Ari Fitzgerald, Legal Advisor, Office of the Chairman  
Mr. Dan Connors, Legal Advisor, Office of Commissioner Ness  
Mr. Paul Misener, Senior Legal Advisor/Chief of Staff,  
Office of Commissioner Furchtgott-Roth  
Mr. Peter Tenhula, Legal Advisor, Office of Commissioner Powell  
Ms. Karen Gulick, Legal Advisor, Office of Commissioner Tristani

**Office of Engineering and Technology**

Mr. Dale Hatfield, Chief

**Wireless Telecommunications Bureau**

Mr. Daniel Phythyon, Bureau Chief  
Mr. John Cimko, Chief, Policy Division  
Ms. Nancy Boocker, Deputy Chief, Policy Division  
Ms. Elizabeth Lyle, Senior Legal Advisor, Office of the Bureau Chief  
Mr. Marty Liebman, Engineer, Policy Division

No. of Copies rec'd  
UNAD CODE

0+2



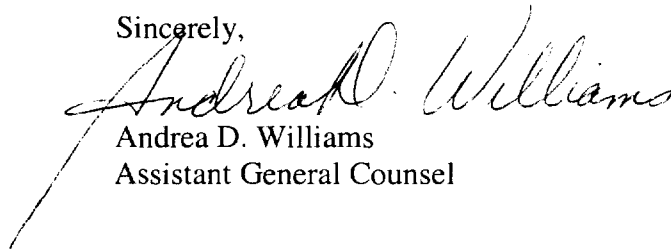
**FCC Disabilities Issues Task Force**

Ms. Meryl Iove, Director

Ms. Pam Gregory, Deputy Director

Pursuant to Section 1.1206 of the Commission's Rules, an original and one copy of this letter and its attachments are being filed with your office. If you have any questions concerning this submission, please contact the undersigned.

Sincerely,

A handwritten signature in cursive script that reads "Andrea D. Williams". The signature is written in black ink and is positioned above the printed name and title.

Andrea D. Williams

Assistant General Counsel

Attachments



# CTIA

Cellular Telecommunications Industry Association

**Andrea D. Williams**

Assistant General Counsel

November 9, 1998

The Honorable William Kennard  
Chairman  
Federal Communications Commission  
1919 M Street, NW, Room 814  
Washington, DC 20554

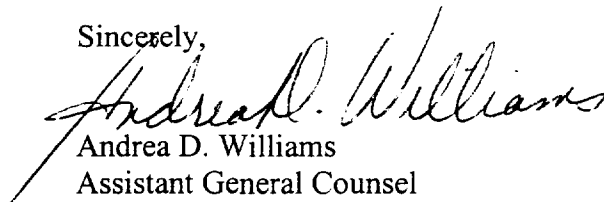
**Re: CC Docket No. 94-102  
E9-1-1/TTY Compatibility Requirements  
Revised Workplan**

Dear Mr. Kennard:

Wireless TTY Forum – 9 met on November 4-5, 1998, in Baltimore, Maryland to finalize its Workplan and the Standard Test Procedure for CDMA, GSM, TDMA and iDEN digital technologies. The attached Workplan and cover report of the Standard Test Procedure have been updated to reflect decisions made by the Forum last week. These documents should be included with the documents filed on October 30, and November 3, 1998, in response to the Wireless Telecommunications Bureau's Order granting a 45-day extension of the suspension of enforcement of the Commission's rules governing TTY access to 9-1-1 over digital wireless systems.

If you have any questions concerning this submission, please contact me at (202) 736-3215.

Sincerely,



Andrea D. Williams  
Assistant General Counsel

Attachments (2)



## **WIRELESS TTY FORUM WORKPLAN: TTY ACCESS OVER DIGITAL WIRELESS SYSTEMS**

Since September 1997, the wireless telecommunications industry (wireless carriers and phone manufacturers), manufacturers of TTY equipment, emergency and relay service provider (9-1-1 and TRS), and consumer organizations that represent individuals who are deaf and hard-of-hearing ("Stakeholders") have undertaken intensive collaborative efforts through the Wireless TTY Forum to develop technically feasible solutions for TTY users to access 9-1-1 over digital wireless systems. To date, the TTY Forum's primary focus has been voice-based solutions in an effort to find an acceptable short-term solution and to meet the FCC's compliance date. The TTY Forum has also proposed several data-based solutions for TTY access to digital wireless systems.

The wireless industry is committed to continuing intensive collaborative efforts to provide viable and practical solutions for TTY access over digital wireless systems not only for 9-1-1 purposes but also to meet the industry's obligations under Sections 225 and 255 of the Communications Act of 1934, as amended. The wireless industry acknowledges that it cannot resolve this issue in a technical vacuum, and that the wireless industry must continue to work cooperatively with TTY manufacturers, the appropriate consumer organizations and organizations representing public safety answering points ("PSAPs") to resolve this issue. Accordingly, the Wireless TTY Forum proposes the following Workplan with scheduled milestones for developing and implementing technical solutions for TTY users to access 9-1-1 over digital wireless systems.

## **PROPOSED WORKPLAN**

### **I. Assessment of Test Results and Finalization of Test Plan**

The TTY Forum has provided preliminary test results and demonstrations on several potential methods for addressing incompatibility between TTYs and the different wireless digital technologies. The TTY Forum developed a uniform test script that manufacturers representing various digital technologies and at least one TTY manufacturer have used in their testing. Test results, however, indicate a wide variance in the character error rate. Furthermore, trying to isolate the cause of the problem within a short time period has been a Herculean yet circumspect task with no conclusive results to date. While the goal is to minimize the character error rate, particularly in 9-1-1 situations, a certain character error rate is inherent with wireline and wireless, both analog and digital technology, and TTY devices.

The co-chairs of the TTY Forum have acknowledged the need for the development of a consistent test methodology, a uniform method of evaluating the test results ("test plan") and TTY performance standards to determine the minimal level of character error rate that TTY users can expect with certain digital technologies used with certain TTY devices.<sup>1</sup>

#### **A. Independent review and assessment of tests conducted to date.**

The TTY Forum has requested Dr. Dale Hatfield, Chief of the FCC's Office of Engineering and Technology ("OET") to review and assess the tests conducted to date. It is anticipated that Mr. Hatfield will provide guidance to the TTY Forum on the soundness of the research conducted to date and identify any discontinuity or gaps in such research that should be explored in the development of a standardized test procedure.

---

<sup>1</sup> Since the September 1998 TTY Forum, the wireless industry has reviewed the initial test results and has concluded that additional testing would not yield new or significant information on character error rates. The wireless industry has acknowledged that there does not appear to be a voice-based solution in the near future which will allow the Baudot signal of a TTY device to pass through the vocoder of a digital air interface and achieve a character error rate comparable to the character error rate achieved with analog air interface, *i.e.*, less than 1%. Nevertheless, the wireless industry has agreed to conduct further testing to assess character error rates and in accordance with the standardized Test Procedure.

### **Target Date**

Review and assess tests conducted to date -**Task Completed**

#### **B. Finalization of a Standard Test Procedure**

The TTY Forum with the assistance of the wireless digital technology groups<sup>2</sup> shall develop a uniform test process designed to limit and control test variables and establish a test methodology yielding better consistency in determining and comparing character error rates ("CER") across the various digital wireless technologies (CDMA, TDMA, GSM 1900, iDEN). Each wireless digital technology group has assumed responsibility for modifying the test process to accommodate testing variances of that technology.

- ◇ Draft Test Procedure – **Task Completed**
- ◇ Submit Test Process to Wireless Digital Technology Groups – **Task Completed**
- ◇ Responses due from wireless digital technology groups regarding modifications, locations of test facilities and test schedules – **10/28/98**
- ◇ Review responses from wireless digital technology groups (Test Plan Sub-task Group) – **10/28/98 – 10/29/98**
- ◇ Submit Test Procedure to FCC and distribute to wireless manufacturers and carriers – **10/30/98**
- ◇ Status Report to TTY Forum – **11/4/98**
- ◇ Review and Feedback on Test Procedures – **TBD by FCC**

#### **C. Conduct additional tests using Test Procedures and compare new results**

Each wireless digital technology group shall identify at least one test facility and advise the TTY Forum as to the availability of the test facility in order to commence testing prior to April 1999.<sup>3</sup> Wireless manufacturers and carriers will conduct tests in accordance with the test schedules submitted and return results to

---

<sup>2</sup> For purposes of the Workplan, wireless digital technology groups refers to the CDMA Development Group ("CDG"), GSM North America, and Universal Wireless Communications Consortium ("UWC Consortium").

<sup>3</sup> GSM NA has indicated that it plans to commence testing as soon as possible with a target date of January 1999 to provide test results to the TTY Forum and the FCC, provided that the following are true: 1) the test specification with modifications suggested by the GSM NA is approved and released by October 30, 1998; 2) lab based testing with real world conditions is accepted; 3) the test specification does not change dramatically; 4) manufacturers can assist the test facilities to set up the test; and 5) no unforeseen restrictions are placed on the testing.

the TTY Forum and the FCC as soon as available. TTY Forum members shall concurrently continue to research acceptable error rates, voice-based and data-based solutions during the test schedule.

The TTY Forum will provide advance notice to all interested parties of the test dates, location of the test laboratories, and contact person. Technical representatives of TTY manufacturers, Gallaudet University, PSAPs and the FCC are encouraged to participate in the testing and should contact the appropriate manufacturer or carrier conducting the test to discuss participation.

**Goals and Target Dates**

*Refer to Test Procedure for list and availability of test labs and scheduled target dates for conducting the additional tests.*

**D. Analysis of test results and recommendations**

The TTY Forum will appoint a sub-group comprised of representatives from each of the Stakeholder groups. The sub-group will review and analyze the test results and provide specific comments and recommendations to the TTY Forum and the FCC based on the test results.

**Goals and Target Date**

**January 1999**

**II. User Requirements**

Consumer representatives of the TTY Forum have provided the TTY Forum with two documents outlining their criteria with respect to solutions: *Consumer Approved Criteria for Acceptance of 'One Phone Model Per Service Provider as of October 1' Proposal* ("Consumer Criteria Document") and *September 10, 1998 Memorandum from Consumer Representatives to TTY Forum* ("September 1998 Consumer Memo").

**A. Consumer Criteria Document**

The purpose of the document was to stimulate discussion and solicit the views of the wireless carriers and manufacturers participating in the TTY Forum. At the September 1998 TTY Forum Meeting, CTIA, on behalf of its members, submitted its comments to the criteria set forth in the Consumer Criteria Document.<sup>4</sup> CTIA's senior staff and the drafters of the Consumer

---

<sup>4</sup> Letter from Andrea Williams, Assistant General Counsel, Cellular Telecommunications Industry Association, to Ed Hall and Mary Madigan, Co-

Criteria Document shall meet at a mutually agreeable time to address the criteria in the context of CTIA's inter-disciplinary approach to accessibility under Section 255.

**Goals and Target Date**

Meeting to be held on a mutually agreeable date but no later than December 15, 1998.

**B. September 1998 Consumer Memo**

On September 10, 1998, representatives of the consumer groups circulated a document to members of the TTY Forum outlining a new set of criteria to address only functional characteristics of any proposed solution for TTY access to digital wireless systems.<sup>5</sup> In accordance with the FCC's Extension Order, the TTY Forum shall consider whether the criteria set forth in the September 1998 Consumer Memo is supported in the proposed voice-based and data-based solutions set forth in this Workplan. Consideration of the criteria shall be documented in a matrix of proposed technical solutions.

**Goals and Target Date**

- ◇ Develop matrix of proposed technical solutions - **Task completed**
- ◇ Finalize matrix (Task Force Members) - **Task Completed**
- ◇ Submit matrix with Workplan to FCC - **10/30/98**

**III. Performance Standards for TTY Devices**

Over the past several months, there has been significant discussion concerning the lack of uniform performance standards among TTY devices. Manufacturers of wireless handsets have indicated that such standards are critical in trying to address the technical challenges of voice-based solutions, including passing the Baudot signal of a TTY device over a digital air interface without any modification to the handset

---

Chairs, Wireless TTY Forum, Sept. 8, 1998. Attached to October Quarterly Status Report as Appendix Q.

<sup>5</sup> Memorandum from Consumer Representatives to TTY Forum, Sept. 10, 1998. Attached to October Quarterly Status Report as Appendix R.

The FCC's Wireless Telecommunications Bureau has elevated the new list of criteria by attaching it to the Extension Order as an appendix and holding it out as an example of what consumer groups would like to have incorporated into any solution implemented by the Forum, and therefore the workplan. See Extension Order at 4.



or the TTY device. The TTY Forum also discussed the need for a list of "most often used" TTY devices and specifications for each device if TTY manufacturers are not using the EIA Draft Standard.<sup>6</sup> Two TTY manufacturers (Ultratec and Ameriphone) have agreed to identify the typical operating characteristics of the majority of existing TTYs and submit this information as a contribution to the TTY Forum. The TTY Forum will also compile a list of the TTY devices used in the tests. A letter will be sent to a third TTY manufacturer (Krown) again requesting their participation in the TTY Forum, specifically providing typical operating characteristics of its existing TTYs.

#### **Goals and Target Dates**

Discussion of TTY manufacturers' willingness to incorporate EIA Draft Standard - **TTY Forum - 9 (11/4/98-11/5/98)**

Submission of document listing typical operating characteristics of the majority of existing TTYs – **Week of 11/9/98**

Letter to third TTY manufacturer – **Week of 11/9/98**

#### **IV. Proposed Technical Solutions**

To provide TTY users with a variety of solutions and to allow manufacturers and service providers maximum flexibility to develop innovative technology and services for TTY users, the TTY Forum has posed several voice-based and data-based solutions. The TTY Forum presently does not support any one solution over others. The TTY Forum has developed a matrix of proposed voice-based and data-based solutions. The matrix sets forth the implementation stages, the advantages and disadvantages of each solution, whether the consumer requirements set forth in the September 1998 Consumer Memo are supported, and the corresponding milestones scheduled for each phase of implementation. Please refer to Appendix C: Solutions Matrix and WorkPlan for target dates where applicable.

##### **A. Proposed Voice-Based Solutions**

The TTY Forum defines voice-based solutions as those solutions whereby the Baudot signal passes through the Vocoder. Proposed voice-based solutions include connection method solutions such as:

- ◆ Direct Audio Connection
- ◆ RJ-11-type Modular Connection/Jack (Analog Solution)
- ◆ True RJ-11 Connection

---

<sup>6</sup> See Electronic Industries Association, Memorandum to Parties Interested in EIA Standards Project PN 1663, Telecommunications Devices for the Deaf, May 16, 1988, 1. Attached to October Quarterly Status Report as Appendix J.

- ◆ Acoustic Solution
- ◆ Proprietary Solutions

Other proposed voice-based solutions include solutions that may require modification of the Vocoder.

#### **Direct Audio Connection**

It appears that coupling via a direct audio connection between the TTY device and a digital wireless handset, *i.e.*, a 2.5 mm audio interface, is a preferred voice-based solution for some wireless carriers. A proposal for a wireless phone 2.5mm audio interface to TTY devices has been submitted to the TTY Forum.<sup>7</sup> The proposal noted that audio output and input levels are different for each make and model phone. Thus, manufacturers of wireless phones would need to provide a special adapter with standard levels. Moreover, audio output and input levels of TTY devices have yet to be defined. The proposal recommended a "common interface" to resolve the variance in output and input levels.<sup>8</sup> While the TTY Forum has reviewed a draft Technical Information Document ("TID"), the TID will be finalized at TTY Forum-9 and will be distributed to manufacturers and carriers shortly thereafter. Members of the TTY Forum will also prepare a Standards Requirements Document ("SRD") for submission to TIA TR45 in early December 1998.

#### **Acoustic Solution**

Ericsson has indicated that it plans to pursue this option. Due to the confidential nature of Ericsson's marketing plans for this option, the TTY Forum recommends that the FCC meet with the manufacturer under confidentiality to discuss specific implementation plans and scheduled milestones.

#### **RJ-11-type Modular Connection/Jack (Analog Solution)**

The TTY Forum has discussed this option and does not consider it to be a viable short-term solution. Thus, the Forum has not pursued development or implementation of this option.

#### **True RJ-11 Connection**

---

<sup>7</sup> See Proposed - Wireless Phone 2.5mm Audio Interface to TTY/TDD ("2.5mm Audio Interface Proposal"). Attached to October Quarterly Status Report as Appendix K.

<sup>8</sup> See 2.5mm Audio Interface Proposal at 3-4. Attached to October Quarterly Status Report as Appendix K.

The TTY Forum has discussed this option and does not consider it to be a viable short-term solution. Thus, the Forum has not pursued development or implementation of this option.

### **Proprietary Solutions**

Several proprietary solutions such as the Mobility™ TTY, an enhanced TTY device developed by Lober & Walsh Engineering, the AxCell Interface Device developed by Sendele Wireless Communications and the RangeStar™ Technology developed by RangeStar International, have been presented to the TTY Forum for consideration as solutions. Due to the proprietary nature of these solutions, the TTY Forum has not been privy to how soon these products will be made commercially available. The TTY Forum recommends that the FCC meets with each company separately and under confidentiality to discuss specific implementation plans and scheduled milestones.

### **B. Proposed Data-Based Solutions (Circuit-Switched)**

The proposed data-based solutions include Inter-Working Function solutions, Third Party Gateway and Proprietary Data-based solutions. The TTY Forum has adopted a SRD for Circuit-Switched Data, which will be submitted to TR45 in early December 1998.

### **Inter-Working Function Solutions**

These solutions rely on the development and installation of the appropriate inter-working function (IWF) software into a wireless carrier's network infrastructure. There are at least two proposed IWF solutions: the V.18 standard and proprietary TTY modems. While the standards for GSM, TDMA, iDEN and CDMA support the IWF functionality, minor modifications are necessary for TTY applications. Implementation of IWF solutions requires completion of product development and deployment, including billing capabilities for data, installation of TTY software in the subscriber terminal, installation of the IWF infrastructure which may be installed per switch or shared among a carrier's switches. In addition, V.18 capable modems need to be manufactured for use in the United States. The estimated timeframes set forth in the Matrix are contingent upon several factors: availability of modems incorporating V.18 standard or other enhanced protocols; timely resolution of any unanticipated technical glitches in product development and deployment as well as installation of the IWF infrastructure; and the availability of the appropriate engineering staff.

The TTY Forum will send a letter to IWF and modem manufacturers notifying them about the TTY Forum's work and the demonstrations of an IWF (V.18) as one type of viable data-based

solutions. The letter will also request information and the projected time period concerning the incorporation of V.18 standard.

Letter to IWF and modem manufacturers: **Week of 11/9/98**

### **Third-Party Gateway Solution**

Another proposed data-based solution is a Third Party Gateway Solution, which is a solution, using the Inter-working function (IWF) but it need not be installed in every carrier's network. A third party vendor would supply a number for a TTY user to call into and then complete the call to a landline TTY using the IWF.

The TTY Forum discussed this option at the November 1998 Forum. The Forum and does not consider it to be a viable solution. Thus, the Forum will not pursue development or implementation of this option.

### **Proprietary Data-based Solutions**

To be reviewed at future TTY Forums.

## **V. Notification to Subscribers and Potential Subscribers who use TTYs**

In compliance with the FCC's rules, wireless carriers have notified subscribers and potential subscribers that they may not be able to use TTYs to access 9-1-1 over digital wireless systems. Wireless carriers, with the support of the wireless trade associations, the consumer advocacy groups, TTY manufacturers and wireless handset manufacturers, will continue to notify subscribers and potential subscribers at appropriate intervals until a product is commercially available.

### **Goals and Target Date**

On-going until product is commercially available.

## **APPENDIX C**

### **SOLUTIONS MATRIX AND WORKPLAN**

Task Force Members to Complete the Data Base Solutions Matrix:

- Todd Lantor
- Norm Williams
- Judy Harkins
- Ron Schultz
- Nikolai Leung
- Mohamed El-Rayes
- UWCC member
- Steve Coston
- John Suprock
- Brye Bonner

Group is empowered to complete matrix below on behalf of the TTY Forum.

**PROPOSED VOICE-BASED SOLUTIONS**  
**(Passing Baudot signal through the VOCODER)**

<b>Proposed Solution</b>	<b>Testing/ Implementation</b>	<b>Advantages/ Disadvantages</b>	<b>Consumer Requirements Supported</b>	<b>Milestones</b>
<i>Direct Audio Connection</i> (2.5 mm Jack – Preferred Method)	<ol style="list-style-type: none"> <li>1. Finalize Technical Information Document,</li> <li>2. SRD,</li> <li>3. Develop Standard, SDO</li> <li>4. Notify TTY Phone Manufacturers</li> </ol>	<p>Advantages:</p> <ul style="list-style-type: none"> <li>• Cost effective</li> <li>• Small in size</li> <li>• Rapid to implement</li> <li>• High Immunity to interference</li> <li>• Recognized industry connector</li> <li>• Does not require additional power supply</li> <li>• May allow connection to other devices</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>• Requires modification/ adapter to TTY</li> <li>• Yields no inherent improvement to CER</li> <li>• Supports only limited features</li> </ul>	<ol style="list-style-type: none"> <li>1. Preferred over acoustic</li> <li>2. Supported</li> <li>3. Supported</li> <li>4. Supported</li> <li>5. TBD</li> <li>6. Supported</li> <li>7. Supported</li> <li>8. Supported</li> <li>9. Supported</li> <li>10. N/A</li> <li>11. N/A</li> <li>12. N/A</li> <li>13. N/A</li> </ol>	<ol style="list-style-type: none"> <li>1. Nov 1998</li> <li>2. Submit to TR45– Dec 1998</li> <li>3. Ericsson to identify timetable with TR45 actual date to be posted on listserve</li> <li>4. TBD by #3</li> </ol>

Proposed Solution	Testing/ Implementation	Advantages/ Disadvantages	Consumer Requirements Supported	Milestones
<i>RJ11-type Modular Connection/ Jack</i> (Analog Solution)	1. Develop Technical Information Document, 2. SRD, 3. Develop Standard 4. Notify TTY Phone Manufacturers	Advantages: <ul style="list-style-type: none"> <li>• Could support full functionality</li> <li>• Could support some of the embedded base of TTYs</li> </ul> Disadvantages: <ul style="list-style-type: none"> <li>• Physical size</li> <li>• Cannot use handset for VCO functions (may require separate device for HCO/VCO)</li> </ul>	1. Preferred over acoustic 2. Supported 3. Supported 4. Supported 5. TBD 6. Supported 7. Supported 8. Supported 9. Supported 10. N/A 11. N/A 12. N/A 13. N/A	This option is not considered a short-term solution by the Forum and therefore is not being pursued by this Forum at this time.

Proposed Solution	Testing/ Implementation	Advantages/ Disadvantages	Consumer Requirements Supported	Milestones
<i>Acoustic solution</i> – use of external landline handset	1. No Standardization required	<p>Advantages:</p> <ul style="list-style-type: none"> <li>No standardization required</li> <li>Supports most embedded base of TTYs</li> <li>Very Low interface cost</li> <li>Short development cycle</li> <li>Easily accessible to standardized landline handsets</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>Highly susceptible to background noise</li> <li>Bulky – requires a landline handset and cable</li> </ul>	1. Could negatively impact CER 2. Supported 3. Supported 4. Supported 5. TBD 6. Supported 7. Supported 8. Supported 9. Supported 10. N/A 11. N/A 12. N/A 13. N/A	TBD by manufacturer
<i>Proprietary</i> <ul style="list-style-type: none"> <li>Phone Products</li> <li>Terminals</li> </ul>	Unknown	Unknown	Unknown	Unknown FCC can meet with stakeholders



Proposed Solution	Testing/ Implementation	Advantages/ Disadvantages	Consumer Requirements Supported	Milestones
<i>True RJ-11 Connection</i>	<ol style="list-style-type: none"> <li>1. Develop Technical Information Document,</li> <li>2. SRD,</li> <li>3. Develop Standard</li> <li>4. Notify TTY Phone Manufacturers</li> </ol>	<p>Advantages:</p> <ul style="list-style-type: none"> <li>• Supports full functionality</li> <li>• Support some of the embedded base of TTYs</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>• Physical size</li> <li>• Cannot use handset for VCO functions (may require separate device for HCO/VCO)</li> <li>• Requires additional power supply</li> <li>• Expensive</li> <li>• Bulky</li> </ul>	<ol style="list-style-type: none"> <li>1. Preferred over acoustic</li> <li>2. Supported</li> <li>3. Supported</li> <li>4. Not Supported</li> <li>5. TBD</li> <li>6. Supported</li> <li>7. Supported</li> <li>8. Supported</li> <li>9. Supported</li> <li>10. N/A</li> <li>11. N/A</li> <li>12. N/A</li> <li>13. N/A</li> </ol>	This option is not considered a short-term solution by the Forum and therefore is not being pursued by this Forum at this time.

Proposed Solution	Testing/ Implementation	Advantages/ Disadvantages	Consumer Requirements Supported	Milestones
<i>Vocoder Modifications</i>		<p>Not cost effective</p> <p>No modification to TTY</p> <p>Using Full rate</p> <p>Extensive international standards development and implementation process.</p> <p>Could provide more reliable CER</p> <p>Potential to degrade voice quality.</p> <p>Error detection and correction would be lower for a data tone call compared to data services.</p>	<p>1. TBD</p> <p>2. Supported</p> <p>3. Supported</p> <p>4. Supported</p> <p>5. TBD</p> <p>6. Supported</p> <p>7. Supported</p> <p>8. Supported</p> <p>9. TBD</p> <p>10. Supported</p> <p>11. Supported</p> <p>12. TBD</p> <p>13. TBD</p>	<ul style="list-style-type: none"> <li>• Develop new standard.</li> <li>• Test new standard for Baudot and voice.</li> </ul>

### PROPOSED DATA-BASED SOLUTIONS – Circuit-Switched

Proposed Solution	Testing/Implementation	Advantages/Disadvantages	Consumer Requirements Supported	Milestones
<b>Inter-Working Function (IWF):</b> <ul style="list-style-type: none"> <li>V.18 (Baudot)</li> <li>Proprietary TTY Modem</li> </ul>	<ul style="list-style-type: none"> <li>Complete Data SRD</li> <li>CDMA existing IS-707</li> <li>TDMA existing IS-135</li> <li>Standards Modifications TBD based on SRD.</li> <li>Test with existing TTYs for both inbound and outbound calls.</li> <li>Test with PSAP, existing TTY using existing standards</li> </ul>	<p>Advantages:</p> <ul style="list-style-type: none"> <li>Reliable Communications, as good as wireline.</li> <li>World-wide Standard</li> <li>Requires little or no modifications to existing TTY</li> <li>Could support more platforms, TTYs, PDAs, and Laptops.</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>Not all Carriers may choose to implement data services.</li> <li>Compatible with all current Baudot standards, except Ultratec's Turbocode.</li> <li>Require mobile connection interface to existing TTYs.</li> <li>IWF do not support VCO</li> <li>IWF with Baudot not commercially available</li> </ul>	<ol style="list-style-type: none"> <li>Supported</li> <li>TBD</li> <li>TBD</li> <li>N/A</li> <li>TBD</li> <li>Supported</li> <li>Supported</li> <li>Supported</li> <li>Not Supported</li> <li>Supported</li> <li>TBD</li> <li>Supported</li> <li>Supported</li> </ol>	<ul style="list-style-type: none"> <li>Est. Timetable 12-18 months</li> <li>Implement Baudot/V.18 in the IWF</li> <li>Widespread deployment of the IWF</li> <li>Update handsets to support data service.</li> </ul>

<b>Proposed Solution</b>	<b>Testing/Implementation</b>	<b>Advantages/Disadvantages</b>	<b>Consumer Requirements Supported</b>	<b>Milestones</b>
<i>3<sup>rd</sup> Party Gateway</i>		Advantages: <ul style="list-style-type: none"> <li>Landlines TTY do not need to be modified.</li> </ul> Disadvantages: <ul style="list-style-type: none"> <li>Expensive to operate and maintain.</li> </ul>	1. TBD 2. Not Supported 3. Not Supported 4. Supported 5. TBD 6. Supported 7. Supported 8. Supported 9. TBD 10. N/A 11. Not Supported 12. Supported 13. TBD	This option is not considered a viable solution by the Forum and therefore is not being pursued by this Forum at this time.
<i>Proprietary</i>	Unknown	Unknown	Unknown	Unknown FCC can meet with stakeholders

\*V.18 Letter to modem manufacturers will be drafted by Dick Brandt under the TTY Forum letterhead requesting support for TTY issue.

## **STANDARD TEST PROCEDURE**

In order to meet the requirements of the FCC's October 30, 1998, deadline, the TTY Forum with the assistance of the wireless digital technology groups<sup>1</sup> developed and are finalizing a uniform test methodology ("Test Procedure") to compare character error rates technology by technology (CDMA, TDMA, GSM 1900, iDEN). The TTY Forum has developed four (4) separate documents that are specific to these individual technologies addressed, yet are equivalent in methodology and procedural guidelines necessary to record comparable test results within each technology. These documents are considered "living" documents and are subject to modifications upon initiating the Test Plan (s) described.

While the intent of these documents are to provide uniform test guidelines whereby achieving comparable test results for all technologies, the TTY Forum clearly understands that there are differences within each technology. Therefore, all proposals for change will be reviewed to ensure that the documents do not lose the intended "standardization" between technologies for which they were developed. The Test Procedure documents for the digital wireless technologies CDMA, TDMA, iDEN, and GSM 1900 have been filed in the FCC's E9-1-1 Docket, CC Docket 94-102.

Below is a list of testing facilities, recommended dates, as provided by each wireless digital technology group.

### **GSMNA**

Ericsson Facility  
Cetecom Facility  
Nokia Type Approval Center

GSM NA plans to commence testing as soon as possible with a target date of January 1999 to provide test results to the TTY Forum and the FCC, provided that the following are true: 1) the test specification with modifications suggested by the GSM NA is approved and released by October 30, 1998; 2) lab based testing with real world conditions is accepted; 3) the test specification does not change dramatically; 4) manufacturers can assist the test facilities to set up the test; and 5) no unforeseen restrictions are placed on the testing.

---

<sup>1</sup> For purposes of the Workplan, wireless digital technology groups means the CDMA Development Group ("CDG"), GSM North America, and Universal Wireless Communications Consortium ("UWC Consortium").

### CDG

#### Sprint PCS Test Facility

Sprint PCS has commenced testing and is nearly complete with their testing activities. They have used Samsung handsets in their tests.

#### Bell Atlantic Mobile Test Facility

Bell Atlantic Mobile will test the following handsets: Audiovox, LGIC, Motorola, Nokia, QUALCOMM, and Sony.

Initial tests to be completed by mid-December with all tests completed by late December 1998.

### UWCC

AT&T Wireless Services has offered its test facilities for TDMA tests. They anticipate testing to commence in early January 1999, if not sooner.

### iDEN

Motorola Test System Facility in Plantation, Florida

Testing to commence: December 15, 1998\*

\*Date is subject to change. Motorola will attempt to move the date earlier, if possible.